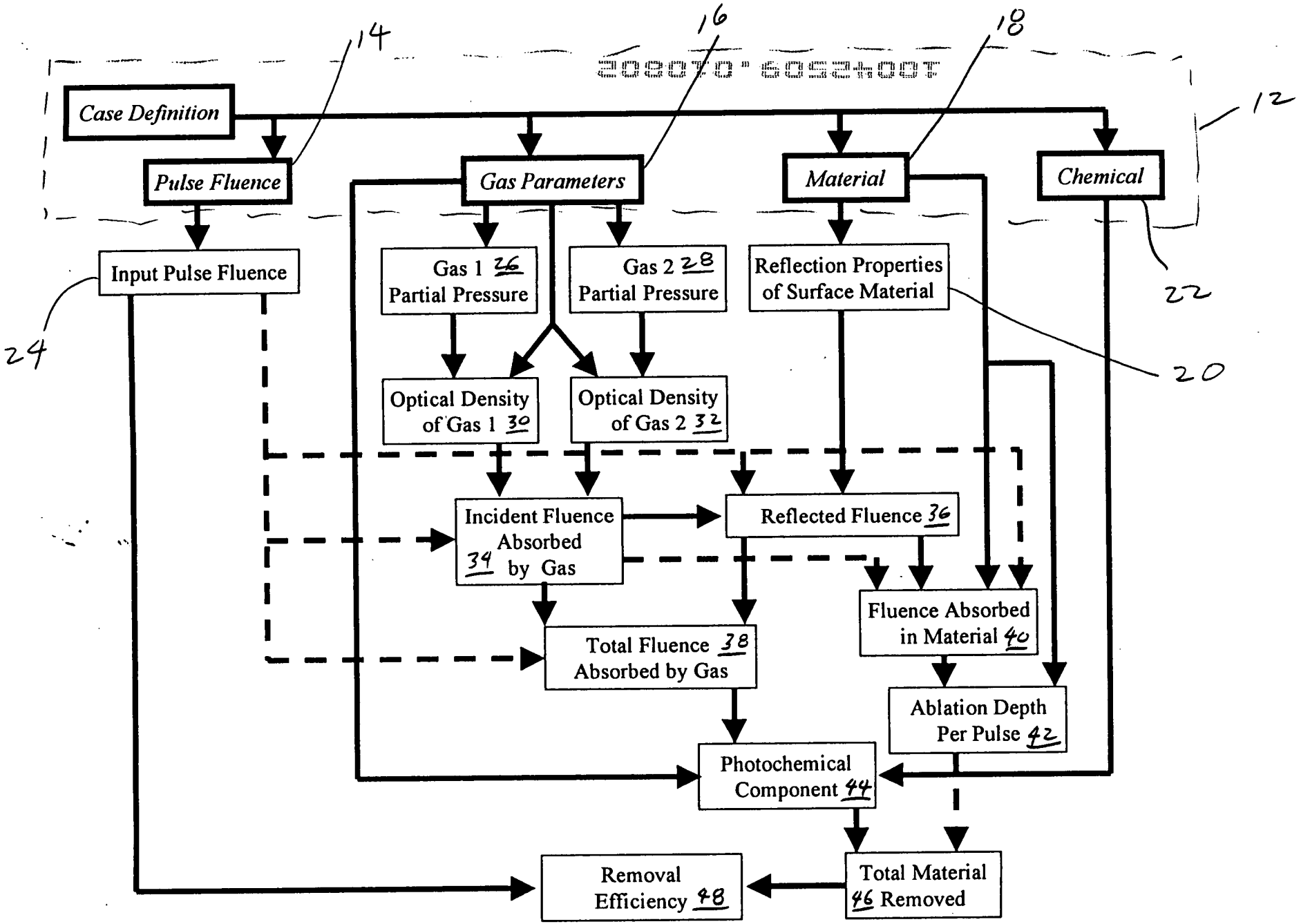

FIG. 1

Applicant: Elliott et al.
Title: PREDICTIVE ALGORITHMIC MODEL
Docket No.: UV-103J
Attorney: Bruce E. Kamerer, Reg. No. 36,181
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54 56 58

UVTech Systems Inc., PhotoChemical Ablation Model

Case Definition

Removed Material	AZ 2400 Photo Resist
Reactive Gases	Ozone + Oxygen
Laser Wavelength (nm)	193 / 248 / 266 / 355

Pulse Fluence

Base Fluence Value (mJ/cm2)	1
Fluence Increment (mJ/cm2)	30

Gas Parameters

Reactive Gases	Starting Partial Pressure (Torr)	Partial Pressure Increment (Torr)	Molecular Cross Section (x 10-20 cm)
Gas 1 (Ozone)	1	0	67.50
	1	0	810.00
	1	0	762.75
	1	0	0.07
Gas 2 (Oxygen)	499	0	0.00675
	499	0	0.0000675
	499	0	0
	499	0	0
other	0	0	0
	0	0	0
	0	0	0
	0	0	0
Total Pressure	500		
	500		
	500		
	500		
Optical Path Through Gas (cm)	3		

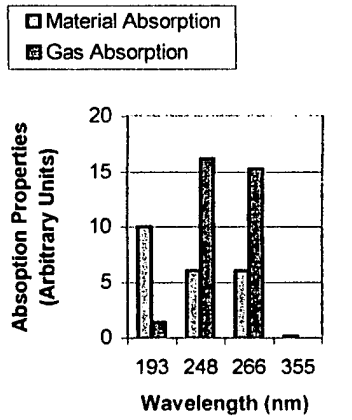
Material Parameters

Material Absorption Coefficient (micron-1)	10	
	1.73	
	1.73	
	0.148	
Material Threshold (mJ/cm2)	5.19	
	30	
	30	
	350.68	
Material Refractive Index	2.10	
	1.90	
	1.86	
	1.74	
Angle of Incidence (Degrees)	0.1	
Reflectivity Amplitude (s & p)	-0.31	0.31
	-0.30	0.30
	-0.27	0.27
Reflectivity Component (s & p)	0.13	0.13
	0.10	0.10
	0.09	0.09
	0.07	0.07
Total Reflectivity	0.13	
	0.10	
	0.09	
	0.07	

Chemical

Photo-chemical parameter 1	0.002
Photo-chemical parameter 2	0.02

Spectral Dependencies



60 62 50 52

FIG. 2

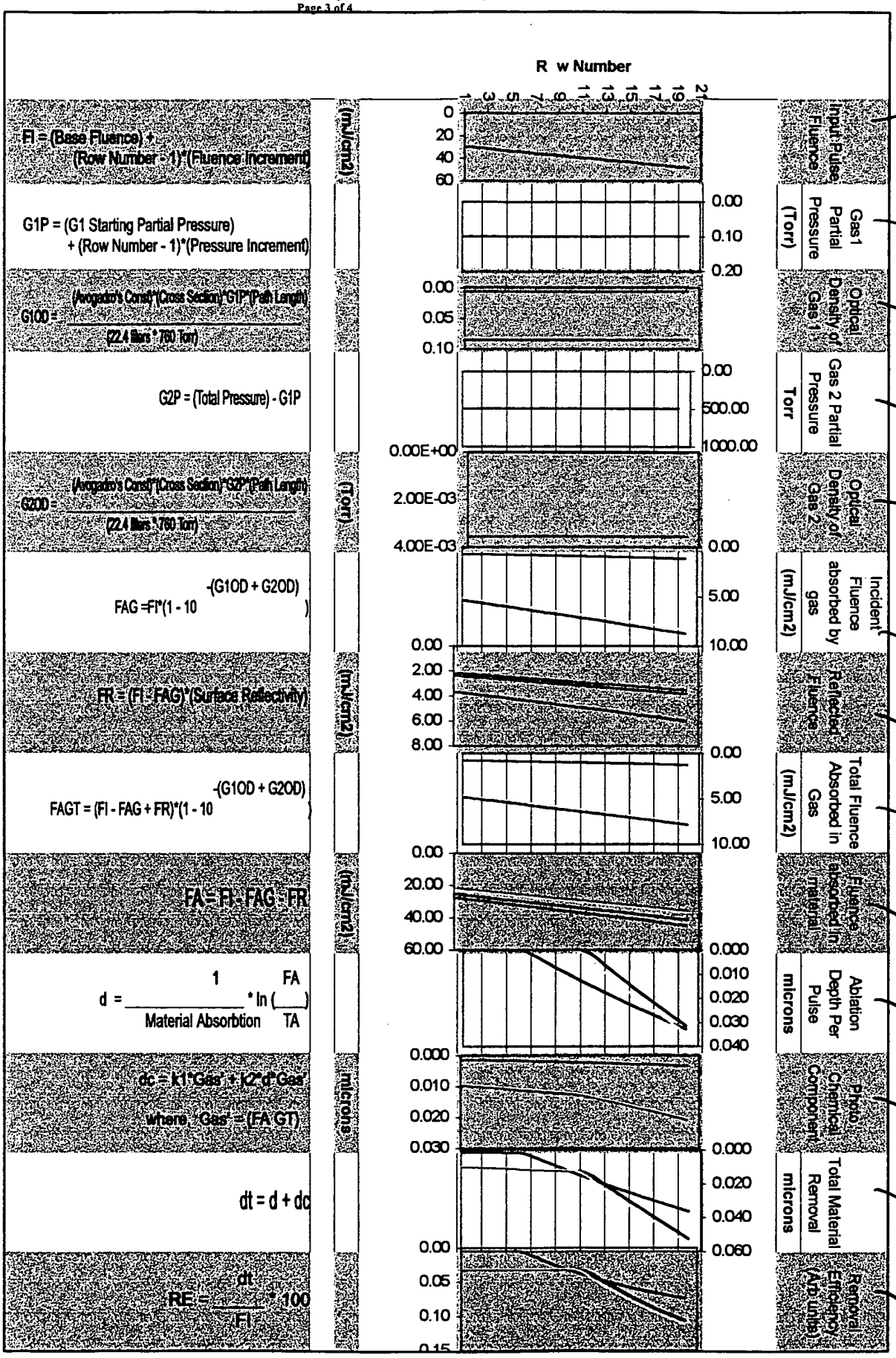

Row Number
Fl = (Base Fluence) + (Row Number - 1)*(Fluence Increment)
G1P = (G1 Starting Partial Pressure) + (Row Number - 1)*(Pressure Increment)
G1OD = (Avogadro's Const)*(Cross Section)*G1P*(Path Length) / (22.4 liters * 760 Torr)
G2P = (Total Pressure) - G1P
G2OD = (Avogadro's Const)*(Cross Section)*G2P*(Path Length) / (22.4 liters * 760 Torr)
FAG = Fl*(1 - 10^-(G1OD + G2OD))
FR = (Fl * FAG)*(Surface Reflectivity)
FAGT = (Fl - FAG + FR)*(1 - 10^-(G1OD + G2OD))
FA = Fl - FAG - FR
d = 1 / Material Absorbtion * ln(FA / TA)
dc = k1*'Gas' + k2*d*'Gas'
where 'Gas' = (FA GT)
dt = d + dc
RE = dt / Fl * 100
(mJ/cm2)
(Torr)
(mJ/cm2)
(mJ/cm2)
(mJ/cm2)
microns
microns
Input Pulse Fluence
Gas1 Partial Pressure (Torr)
Optical Density of Gas 1
Gas 2 Partial Pressure Torr
Optical Density of Gas 2
Incident Fluence absorbed by gas (mJ/cm2)
Reflected Fluence
Total Fluence Absorbed in Gas (mJ/cm2)
Fluence absorbed in material
Ablation Depth Per Pulse microns
Photo Chemical Component
Total Material Removal microns
Removal Efficiency (Arb. Units)
0 20 40 60
0.00 0.10 0.20
0.00 0.05 0.10
0.00 500.00 1000.00
0.00E+00 2.00E-03 4.00E-03
0.00 5.00 10.00
0.00 2.00 4.00 6.00 8.00
0.00 5.00 10.00
0.00 20.00 40.00 60.00
0.000 0.010 0.020 0.030 0.040
0.000 0.010 0.020 0.030
0.000 0.020 0.040 0.060
0.00 0.05 0.10 0.15
24
26
28
30
32
34
36
38
40
42
44
46
48

FIG. 3

24 26 28 30 32 34 36 38 40 42 44 46 48

193 nm

Row Number	(mJ/cm2) Incident Pulse Fluence	(Torr) Gas1 Partial Pressure	Optical Density of Gas 1	(Torr) Gas 2 Partial Pressure	Optical Density of Gas 2	(mJ/cm2) Incident Fluence absorbed by gas	(mJ/cm2)	(mJ/cm2) Total Fluence Absorbed in Gas	(mJ/cm2)	microns Ablation Depth Per Pulse	microns	microns Total Material Removal	Removal Efficiency (no units)
20	91	1.00	0.07	499.00	0.00057226	90.78	90.78	85.99	85.99	0.439	0.439	1.367	0.015
19	86	1.00	0.07	499.00	0.00057226	86.01	86.01	81.47	81.47	0.434	0.434	1.304	0.015
18	81	1.00	0.07	499.00	0.00057226	81.24	81.24	76.95	76.95	0.428	0.428	1.241	0.014
17	76	1.00	0.07	499.00	0.00057226	76.47	76.47	72.44	72.44	0.422	0.422	1.178	0.014
16	71	1.00	0.07	499.00	0.00057226	71.70	71.70	67.92	67.92	0.416	0.416	1.116	0.013
15	66	1.00	0.07	499.00	0.00057226	66.93	66.93	63.40	63.40	0.409	0.409	1.054	0.012
14	62	1.00	0.07	499.00	0.00057226	62.16	62.16	58.88	58.88	0.401	0.401	0.992	0.011
13	57	1.00	0.07	499.00	0.00057226	57.39	57.39	54.36	54.36	0.393	0.393	0.930	0.011
12	52	1.00	0.07	499.00	0.00057226	52.62	52.62	49.85	49.85	0.385	0.385	0.868	0.010
11	47	1.00	0.07	499.00	0.00057226	47.85	47.85	45.33	45.33	0.375	0.375	0.806	0.009
10	43	1.00	0.07	499.00	0.00057226	43.08	43.08	40.81	40.81	0.365	0.365	0.744	0.009
9	38	1.00	0.07	499.00	0.00057226	38.31	38.31	36.29	36.29	0.353	0.353	0.682	0.008
8	33	1.00	0.07	499.00	0.00057226	33.55	33.55	31.78	31.78	0.340	0.340	0.619	0.007
7	28	1.00	0.07	499.00	0.00057226	28.78	28.78	27.26	27.26	0.324	0.324	0.556	0.007
6	24	1.00	0.07	499.00	0.00057226	24.01	24.01	22.74	22.74	0.306	0.306	0.491	0.006
5	19	1.00	0.07	499.00	0.00057226	19.24	19.24	18.22	18.22	0.284	0.284	0.424	0.005
4	14	1.00	0.07	499.00	0.00057226	14.47	14.47	13.70	13.70	0.256	0.256	0.353	0.004
3	9	1.00	0.07	499.00	0.00057226	9.70	9.70	9.19	9.19	0.216	0.216	0.274	0.003
2	5	1.00	0.07	499.00	0.00057226	4.93	4.93	4.67	4.67	0.148	0.148	0.171	0.002
1	1	1.00	0.07	499.00	0.00057226	0.16	0.16	0.15	0.15	0.000	0.000	0.000	0.000

FIG. 4